What Is Claimed Is:

1. A method of manipulating a biological material using a focused beam of laser light, comprising the steps of:

providing a focused beam of laser light in the visible wavelength range to form conditions for an optical trap, the laser light having a wavelength such that the selected material exhibits a selected absorption coefficient in the wavelength range of the laser light which permits manipulation without substantial damage to the biological material;

providing a plurality of the optical traps with the focused beam of laser light, the plurality of optical traps manipulating the biological material; and

controlling the power level of each of the optical traps, the laser light wavelength and the selected resulting absorption coefficient to avoid substantial damage to the biological material.

2. The method of claim 1, wherein the focused beam of laser light includes light in the wavelength of about 400 nm to about 700 nm.

3. The method of claim 1, wherein the beam of light comprises a continuous-wave laser beam.

4. The method of claim 1, further comprising the step of shaping the wavefront of the focused beam of light such that the power required to achieve a predetermined trapping force is reduced relative to a focused beam of light that has not been shaped.

5. The method of claim 4, wherein the beam of light comprises a donut mode.

6. The method of claim 1, wherein the plurality of optical traps arise from a diffractive optical element.

7. The method of claim 1, wherein the power level of each of the plurality of optical traps is controlled to avoid altering the genetic code by a biologically significant amount of the biological material.

8. A method of manipulating a biological material using a focused beam of laser light, comprising the steps of:

providing a continuous-wave, focused beam of laser light having a wavelength such that the material possesses a weak absorption coefficient in the wavelength range of the laser light;

providing at least one optical trap for manipulating a discrete portion of the biological material; and

controlling the power level of the at least one optical traps in conjunction with the weak absorption coefficient to avoid alteration of a substantial portion of genetic code of the biological material.

9. The method of claim 8, wherein a plurality of the optical traps are formed with the focused beam of laser light, wherein each of these traps manipulates a discrete portion of the material.

10. The method of claim 9, further comprising the step of shaping the wavefront of the focused beam of light such that the trapping efficiency of the at least one optical trap is increased relative to not shaping the focused beam of light.

11. The method of claim 10, wherein the focused beam of light comprises a shape calculated to minimize absorption by the material.

12. The method of claim 9, wherein each trapping location is not at a biologically sensitive location in the biological material.

13. A system for manipulating a biological material using a focused beam of laser light, comprising:

a focused beam of laser light having a wavelength range wherein the maximum wavelength is less than the minimum wavelength of infrared light, the focused laser light forming an optical trap and having a wavelength such that the biological material possesses a weak absorption coefficient in the wavelength range of the laser light; and

a plurality of the optical traps for manipulating discrete portions of the biological material,

wherein the power level of each of the optical traps is controlled and along with the weak absorption coefficient enables avoiding at least the alteration of the genetic code of a biologically significant amount of the biological material.

14. The system of claim 13, wherein the focused beam of laser light is selected from the visible and ultraviolet wavelength range.

15. The system of claim 13, wherein the focused beam of laser light comprises a continuous-wave laser beam.

16. The system of claim 15, wherein the wavefront of the focused beam of laser light shaped to achieve a predetermined trapping force is reduced relative to a focused beam of light that has not been shaped.

17. The system of claim 13, wherein the plurality of optical traps comprise holographic optical traps.

18. A method of manipulating a material using a focused beam of laser light, comprising the steps of:

providing a focused beam of laser light in a wavelength range less than the wavelength range for infrared light to form conditions for an optical trap;

providing a plurality of optical traps for manipulating discrete portions of the material; and

controlling the power level of each of the optical traps but avoiding substantial damage to the material.

19. The method of claim 18, wherein the focused beam of laser light is selected from the group consisting of the visible and ultraviolet wavelength ranges.

20. The method of claim 18, further including the step of using laser light with a wavelength to match an absorption window in the material so as to minimize light absorption.

21. A method of manipulating a material using a focused beam of laser light, comprising the steps of:

providing a continuous-wave, focused beam of laser light having a wavelength such that the material possesses a weak absorption coefficient in the wavelength range of the laser light;

providing at least one optical trap for manipulating the material; and

controlling the power level of the at least one optical traps and also the weak absorption coefficient to avoid substantial alteration of the material.